

REMARKS

This application has been carefully studied and amended in view of the Office Action dated February 14, 2008. Reconsideration of that application is requested in view of the following.

The claims have been carefully reviewed and amended to place this application in its best form for allowance. In that regard, it is noted that Claims 10-12 have now been made dependent on Claim 2 in order to provide the antecedent basis in Claims 10-12 which features are found in Claim 2. In addition, Claim 31 has been placed in independent form since it represents an alternative manner of practicing the invention. Claim 36 has been amended to better conform to U.S. practice. Claim 40 has been added which expresses certain aspects of the invention in the form of an independent claim. In order to maintain the same number of claims Claims 17 and 18 have been combined by incorporating the subject matter of Claim 18 into Claim 17 whereupon Claim 18 has been canceled.

There are now still a total of 39 claims which include independent Claims 1, 31 and 40. These amendments accordingly do not require the payment of any supplemental filing fee.

It is respectfully submitted that the pending claims are patentable over Hara, et al. in view of Kaibel. Parent Claim 1 relates to a process for distillatively separating mixtures which includes the step of carrying out the separation in one or more dividing wall columns. Newly added independent Claim 40 also relates to such process and further defines steps involving the use of the dividing wall column for creating the various separation steps in terms of, for example, a side draw stream. Independent parent Claim 31 relates to an alternative practice of the invention wherein instead of practicing the process with dividing wall columns a connection of two distillation columns in the form of a thermal coupling is used.

Hara et al. (US 5,248,827) teach a process for the production of ethylenamines, among them EDA, PIP, DETA, AEEA and MEOA as claimed in the present application. Hara et al. further disclose that these ethylenamines may be separated by distillation, either in a batch

system or in a continuous system. However, this disclosure of Hara et al. concerning the separation by distillation (col. 6, lines 33-36) only represents the general knowledge of a person skilled in the art and does not give any hint how to separate the mixture concretely. The Examiner's reference to Table 1 of Hara et al. on page 3, line 4 in the Office Action is not quite correct in this context. The results given in Table 1 were obtained by gas chromatography, thus by adsorptive separation methods (Hara et al., col. 7, lines 34-37) and not by distillation as the Examiner's statement might suggest.

The difference between the state of the art according to Hara et al. and the claims at hand, particularly independent Claims 1 and 40, is the use of one or more dividing wall columns (DWC) for the separation of the ethylenamines mixture. The Examiner holds that the person skilled in the art would easily combine the DWC technology presented by Kaibel (Chem. Eng. Technol. 10, 1987, p. 82-98) with the separation task in Hara et al. in order to end up with the claimed separation method.

However, applicants respectfully disagree with the Examiner's opinion. The fact that DWCs are suitable for the separation of multicomponent mixtures does not imply that they are applicable to any and all mixtures, irrespective of the substances involved and their respective physico-chemical properties. Furthermore, despite the known advantages, the use of DWCs restrict the flexibility for operating a distillation and introduces higher complexity to the system. Thus, for this reason alone the person skilled in the art would not automatically resort to the DWC technology in order to separate multicomponent mixtures. In addition, mixtures comprising amines are known to pose problems when separation is sought. The Examiner's attention is directed to a reference that is already part of the IDS: Riechers et al. (US 6,627,756 B1) which is concerned with the preparation of pure triethylenediamine (TEDA) by vaporizing TEDA and introducing the gaseous TEDA into a liquid solvent. In this reference it is stated that "owing to its properties [...], TEDA can be handled only with difficulty and with an appropriate engineering outlay if deterioration in the quality of the TEDA [...] is to be avoided" (col. 1, line 65 – col. 2, line 9). This statement is also true for the mixture in question. In particular a solution for the problem of separating the mixture into the components each of which should be

of high purity and high quality was sought. At least for the components EDA, PIP, DETA and AEEA “high purity” means a respective value of more than 99.0% by weight, as can be seen from different citations in the specification (pages 3 to 5). Specifically the problem of color improvements was to be solved (page 2, lines 24-28). Neither Hara et al. nor Kaibel nor any other document of the general state of the art of distillation teaches the separation of the mixture into its components according to the claim herein to produce various products with high purity and high color quality.

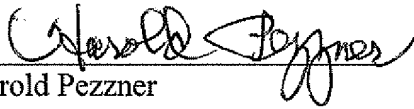
If it is assumed that Hara et al. and Kaibel can be regarded as the relevant prior art and that a person skilled in the art could have combined there documents, accounting for the above remarks on Riechers et al., however, the results of such a combination would not at all have been predictable – as is required in order to support a conclusion of obviousness. Neither Hara et al. nor Kaibel nor the general knowledge provides any teaching wherein substances of the ethylenamines mixture should be separated in a DWC.

In addition to the above comments which are generally applicable to parent Claim 1, the subject matter of newly added independent Claim 40 is clearly not disclosed by nor made obvious from Hara et al. and Kaibel. Claim 40 not only includes all of the features of Claim 1, but in addition recites steps relating to the use of a dividing wall column (DWC) wherein EDA is obtained as a top product and PIP as a side draw stream and/or wherein after the removal of EDA, PIP, MEOA and DETA, AEEA is obtained as a side draw stream from a dividing wall column. Moreover, such prior art does not render obvious the process of parent Claim 31 which uses a connection of two distillation columns in the form of a thermal coupling instead of a dividing wall column.

In view of the above remarks and amendments it is respectfully submitted that the claims should be allowed and that this application should be passed to issue.

Dated: August 12, 2008

Respectfully submitted,

By 
Harold Pezzner

Registration No.: 22,112
CONNOLLY BOVE LODGE & HUTZ LLP
1007 North Orange Street
P.O. Box 2207
Wilmington, Delaware 19899
(302) 658-9141
(302) 658-5614 (Fax)
Attorney for Applicant

627317